



OFFICE OF
ELECTRICITY DELIVERY &
ENERGY RELIABILITY

Development of Electrode Architectures for High Energy Density Electrochemical Capacitors

Prof. B. Dunn (PI), Dr. E. Perre · University of California, Los Angeles

Prof. Y. Gogotsi (co-PI), Dr. V. Presser, M. Lukatskaya · Drexel University, Philadelphia



Purpose

Overarching goal:

High power (electric double layer) *and*
high energy density (pseudocapacitance)

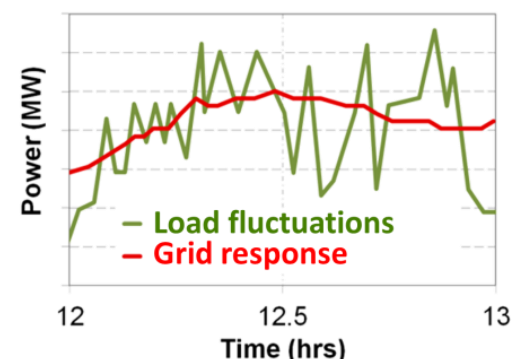
Conceptual approach:

Nanoscale integration of porous
carbons with mesoporous metal oxides

Impact on DoE Energy Storage Mission

Low-cost pseudocapacitive energy storage:

Fast response rate
power management
for grid scale
applications;
integration of
intermittent power
sources



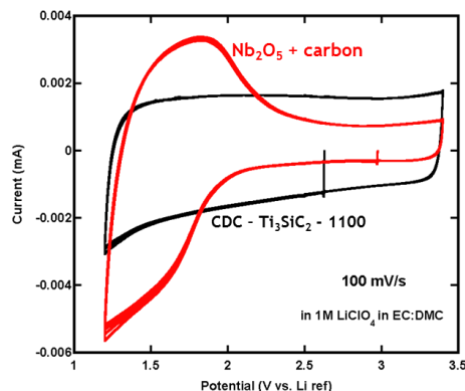
Preliminary Results

Carbon framework: carbide-derived carbon

Hierarchical porosity & large surface area

Niobium oxide:

Increase in energy
density after hydro-
thermal synthesis
on carbon



Research Plan

Near term:

Optimize synthesis to
achieve designed architecture & detailed
material characterization

Next year:

Film preparation; prototype fabrication &
benchmarking

